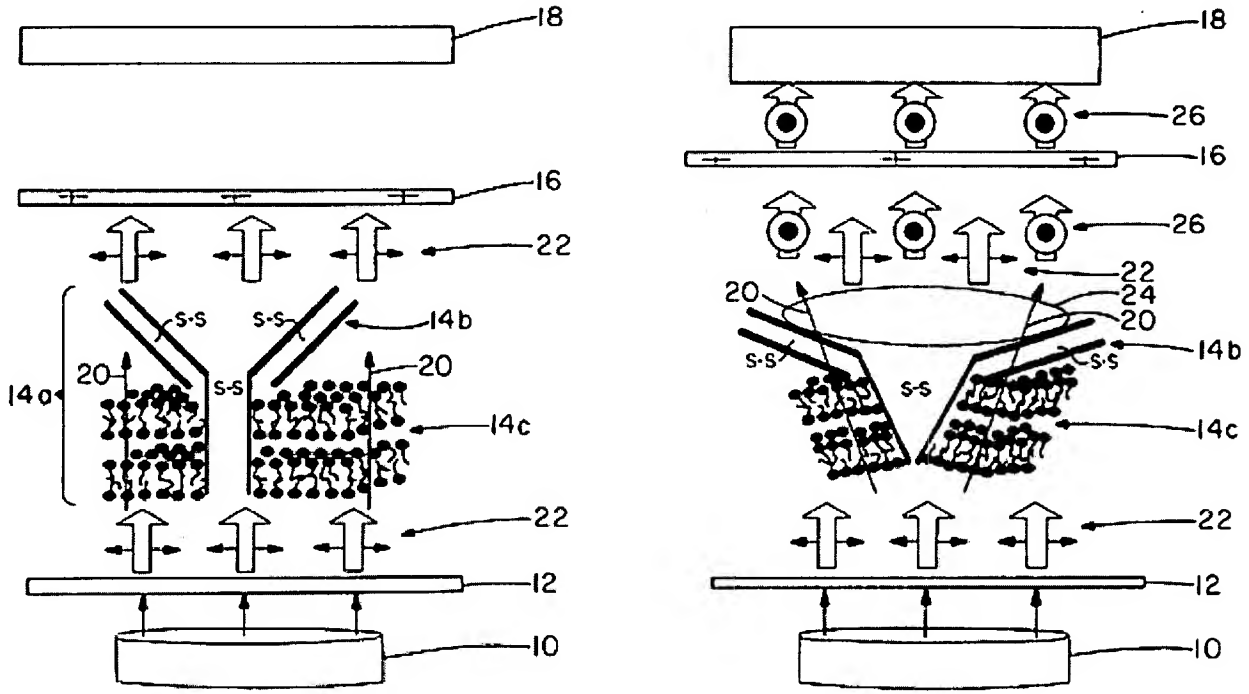
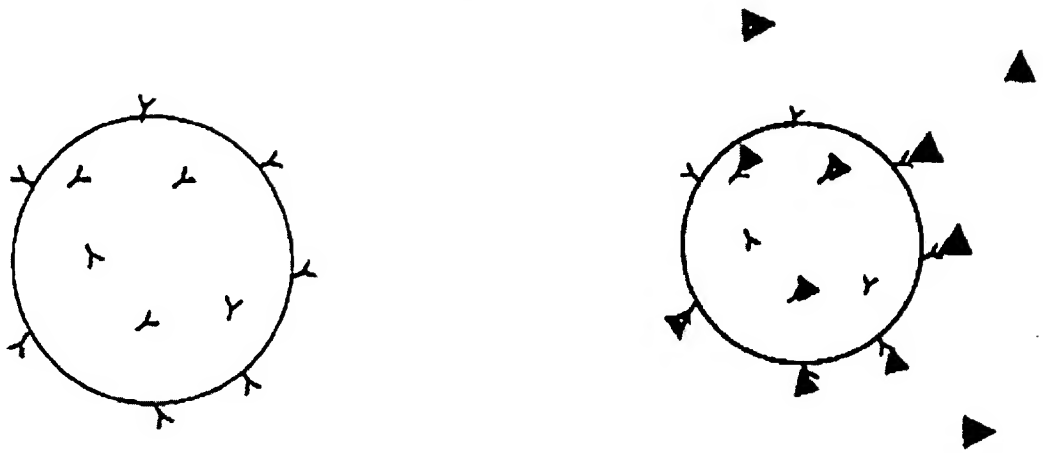
Figure 1


18
16
22
S-S
S-S
14b
20
14a
S-S
20
14c
22
12
10
18
26
16
26
22
20
24
20
14b
S-S
S-S
S-S
14c
22
12
10

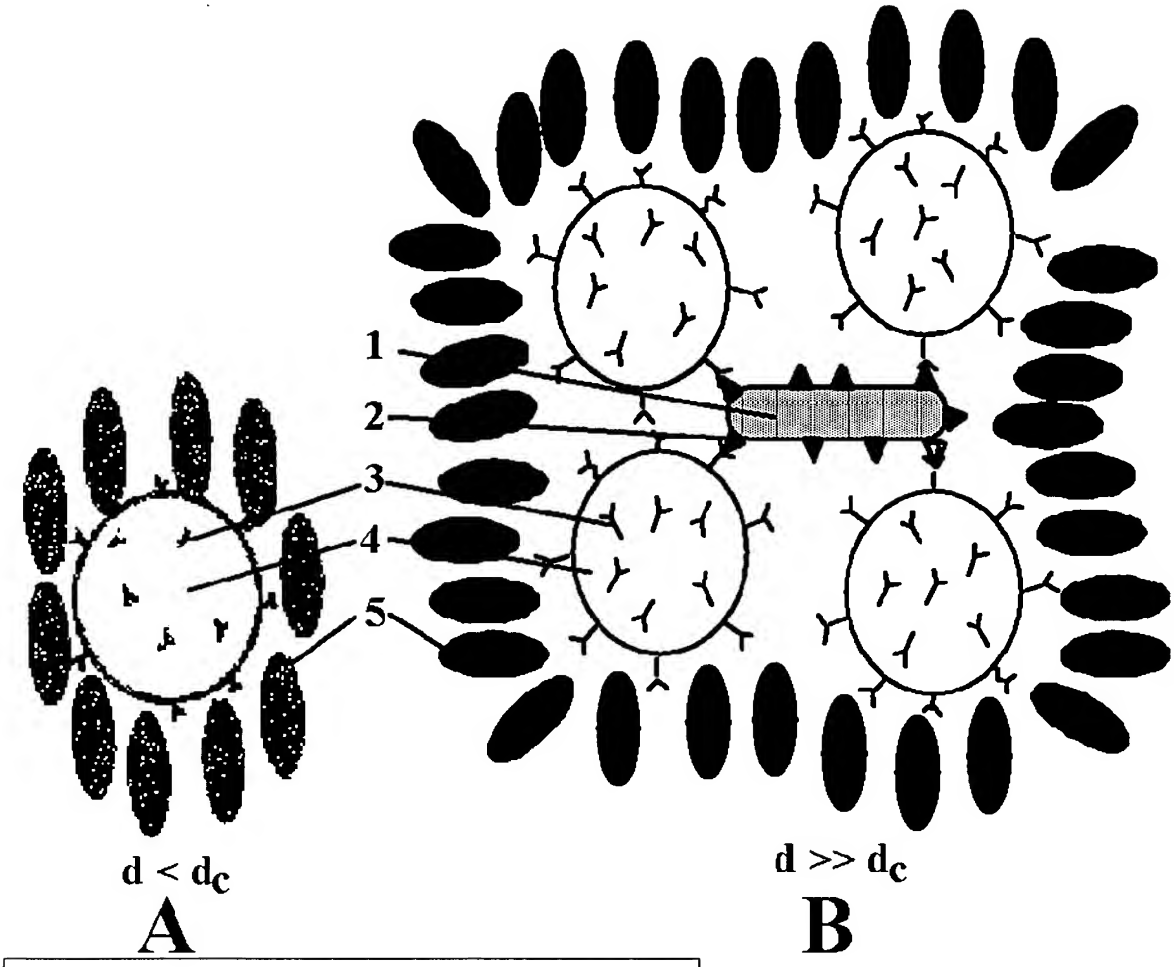
A

B

Figure 2



A B

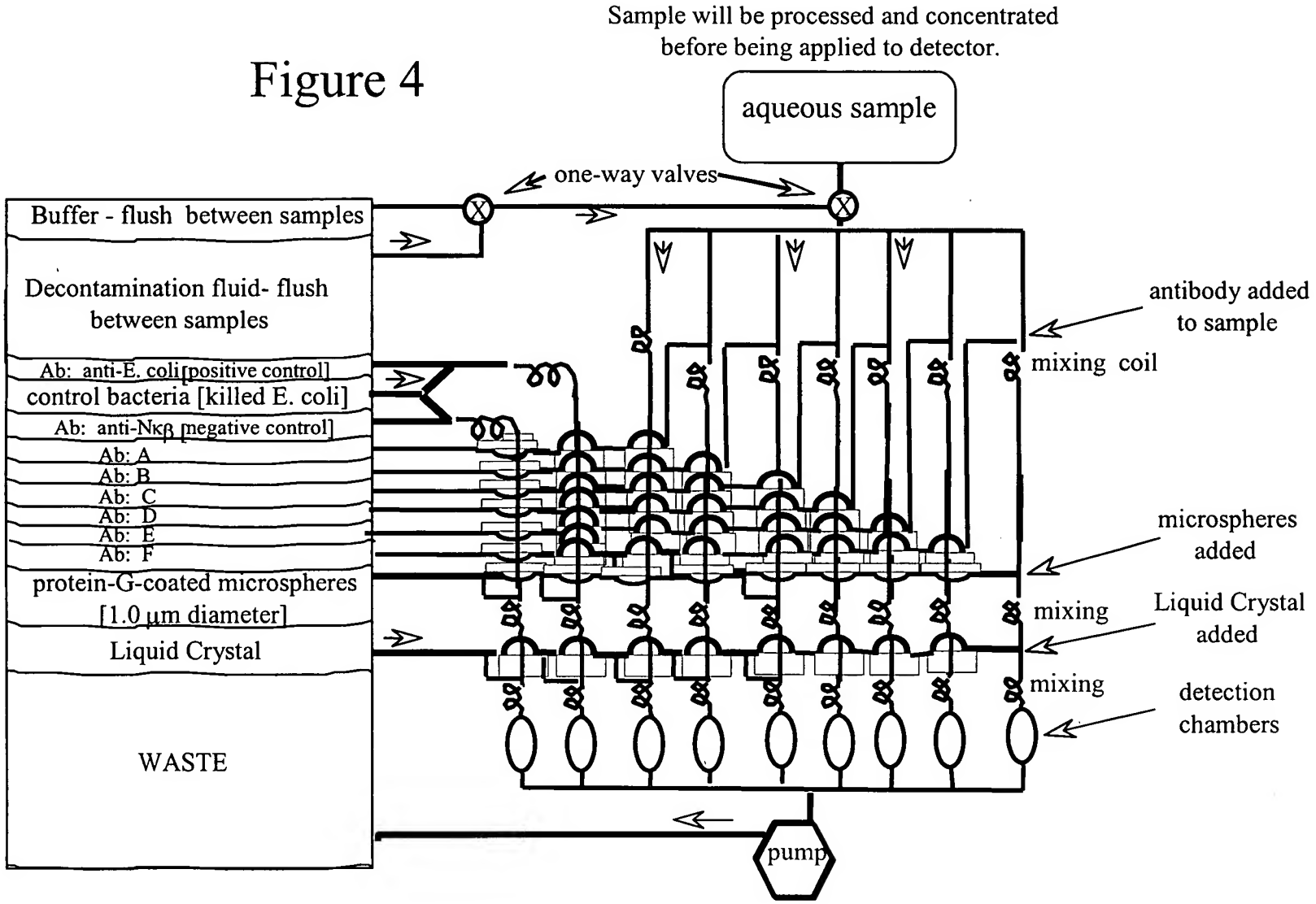


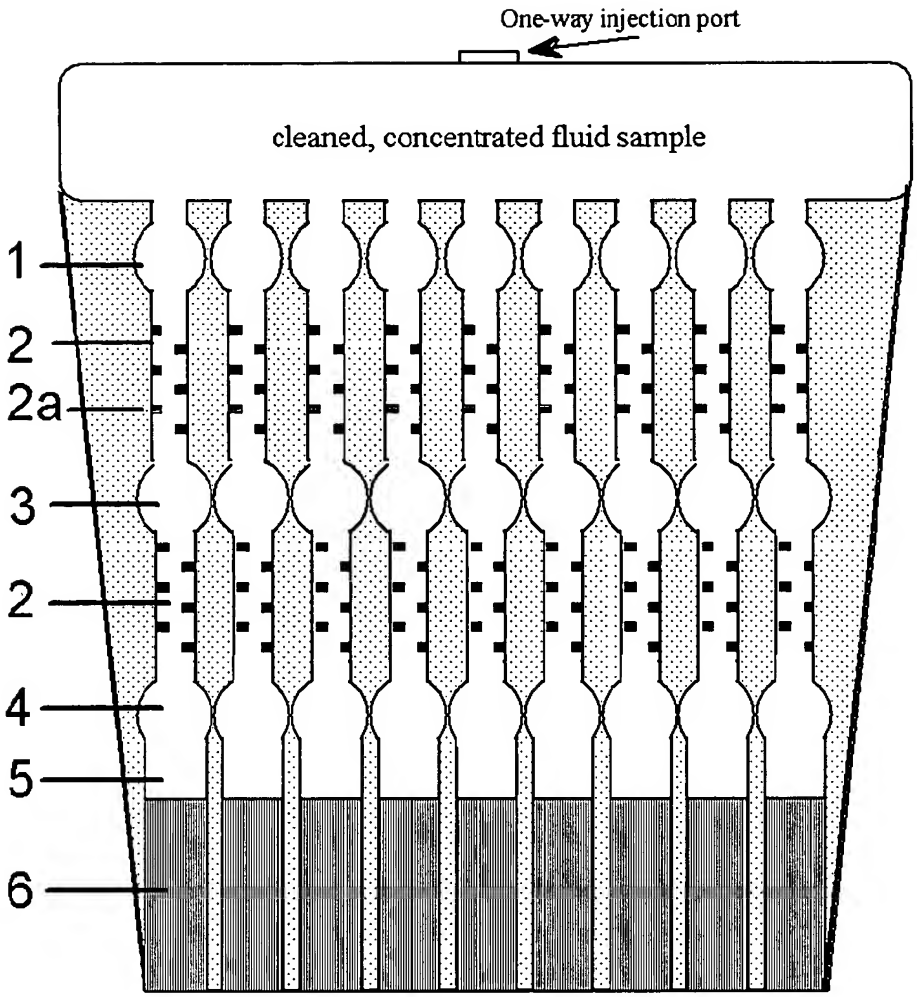
Where:

1 = pathogen
2 = ligand
3 = receptor
4 = microsphere
5 = liquid crystal molecule

Figure 3

Figure 4

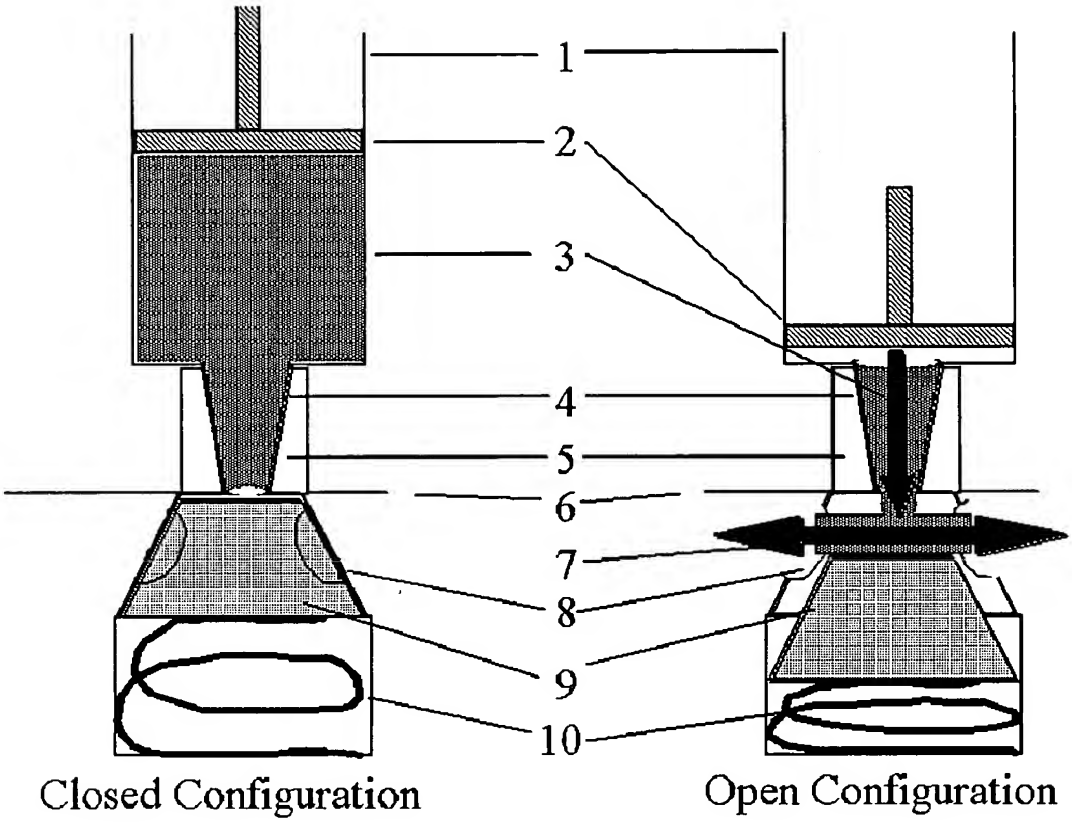

Sample will be processed and concentrated before being applied to detector.
aqueous sample
one-way valves
Buffer - flush between samples
Decontamination fluid- flush between samples
Ab: anti-E. coli[positive control]
control bacteria [killed E. coli]
Ab: anti-Nkβ [negative control]
Ab: A
Ab: B
Ab: C
Ab: D
Ab: E
Ab: F
protein-G-coated microspheres [1.0 μm diameter]
Liquid Crystal
WASTE
pump
antibody added to sample
mixing coil
microspheres added
mixing
Liquid Crystal added
mixing
detection chambers



Where:

1	=	chamber containing antibody
2	=	mixing causway
2a	=	baffles designed to induce mixing
3	=	chamber containing microspheres
4	=	chamber containing liquid crystal
5	=	laminar flow causway
6	=	detection chamber

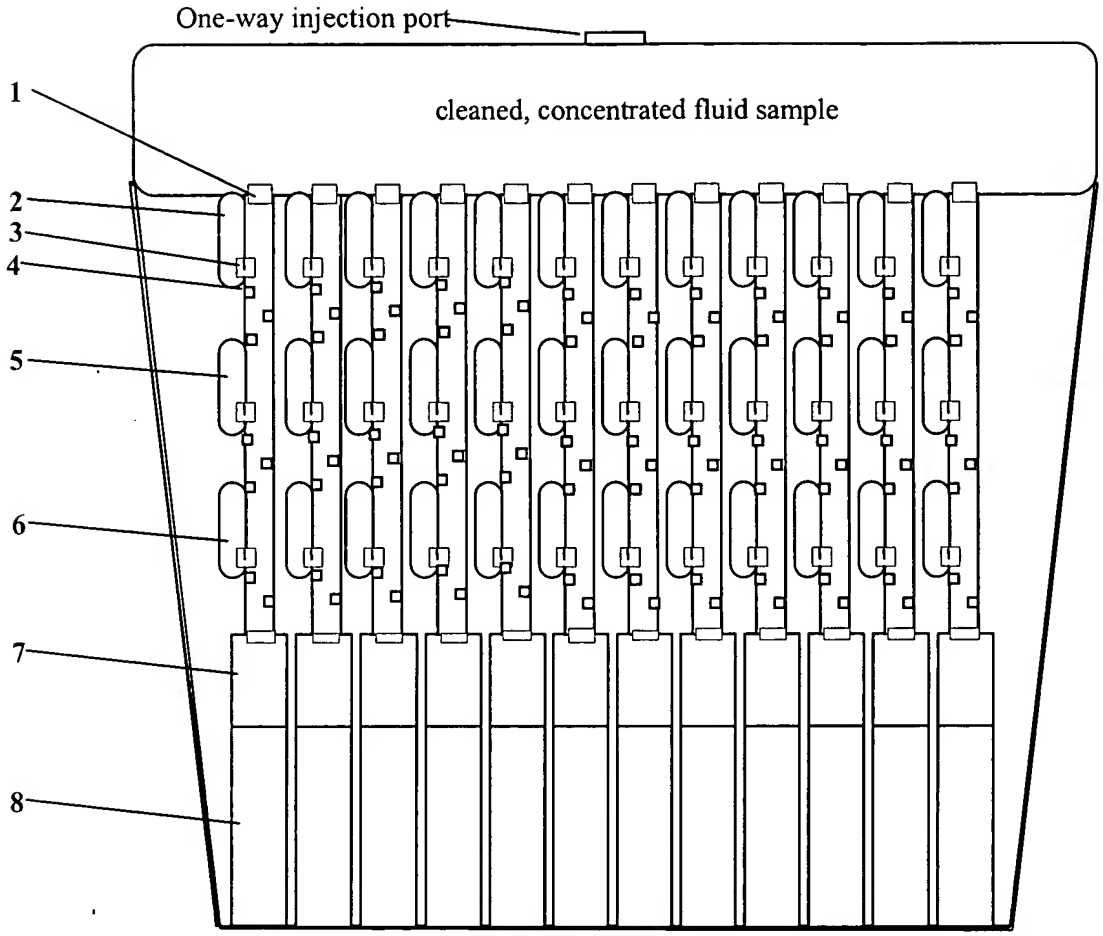
Figure 5



Where:

1 = syringe barrel
2 = syringe plunger
3 = sample
4 = male leur
5 = female leur
6 = cassette wall
7 = sample expelled into cassette
8 = side ports in valve assembly
9 = valve plug
10 = spring

Figure 6

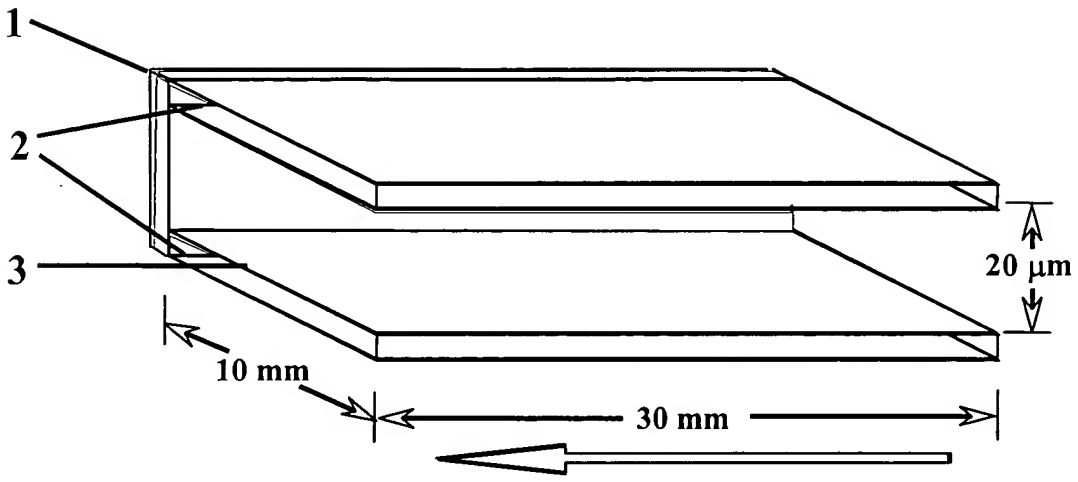


where:

1	=	mixing causway
2	=	blister pack containing antibody
3	=	blister pack wall segment designed to rupture when pressurized
4	=	baffel desinged to induce mixing
5	=	blister pack containing microspheres
6	=	blister pack containing liquid crystal
7	=	laminar flow causway
8	=	detection chamber

Figure 7

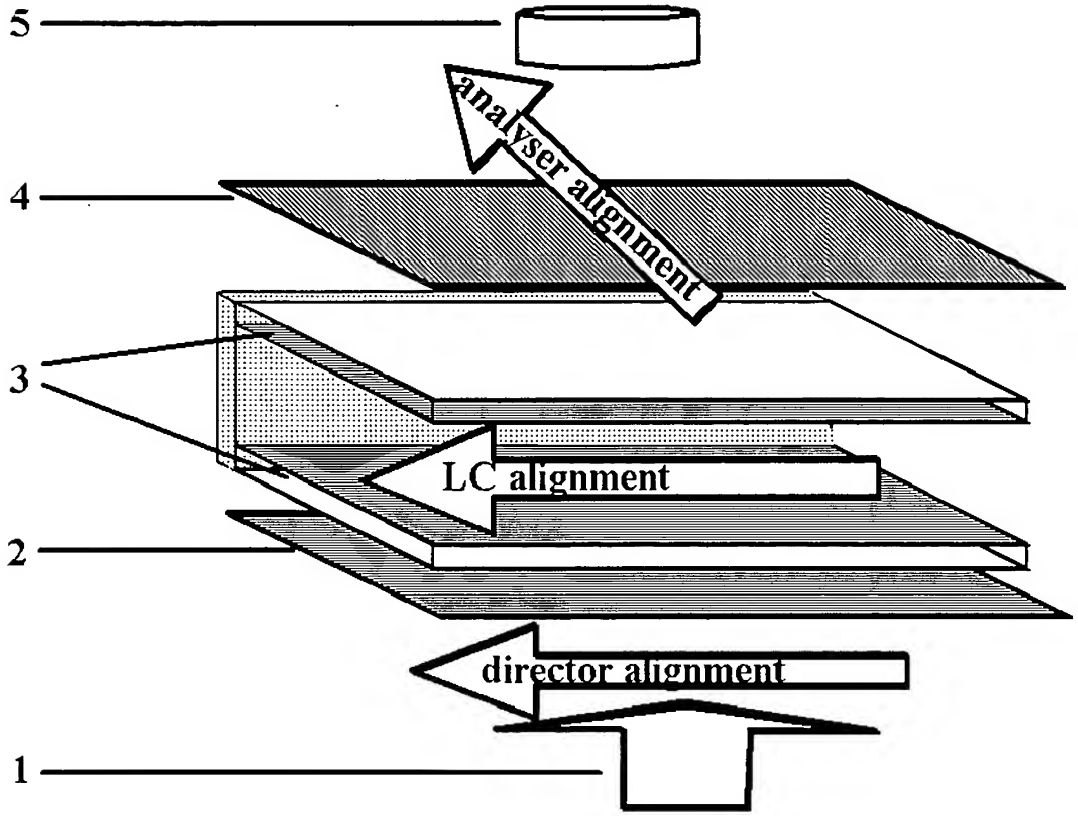
Detection Chamber



where:

1	**=**	**chamber side wall of cassette construction material (foreground wall removed for clarity)**
2	**=**	**transparent plate exhibiting low birefengence**
3	**=**	**plate surface treated to interact with and align liquid crystal with longitudinal axis of chamber (bottom arrow)**

Figure 8



where:

1 = light source

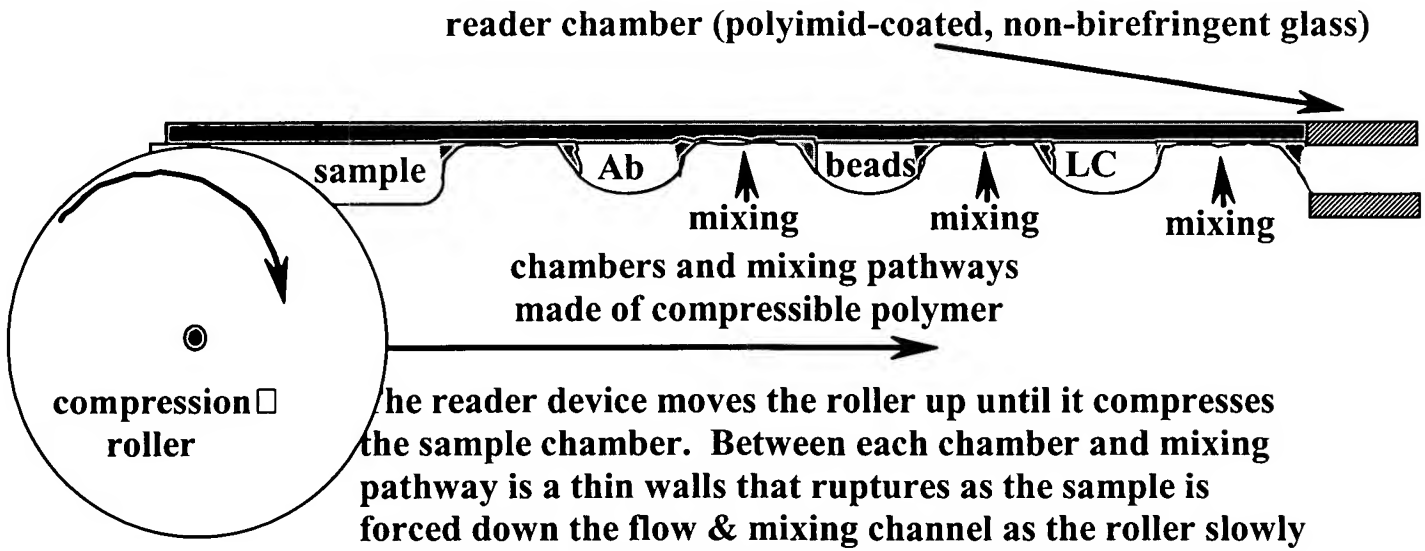
2 = director polarizer aligned with the longitudinal axis of the detection chamber

3 = low bifrengence plates whose surface treatment aligns the liquid Crystal with the director orientation

4 = analyser polarizer aligned perpendicular to the longitudinal axis of the chamber

5 = light detector

Figure 9



The reader device moves the roller up until it compresses the sample chamber. Between each chamber and mixing pathway is a thin walls that ruptures as the sample is forced down the flow & mixing channel as the roller slowly moves to the right. In progressive sequence, antibody, anti-antibody-coated microspheres and liquid crystal are added to and mixed with the sample. The roller stops when the mixed sample is delivered to the reader chamber.

Each sample is a potential biohazard. Thus, samples are applied through an one-way valve and the cassette is completely enclosed.

Figure 10

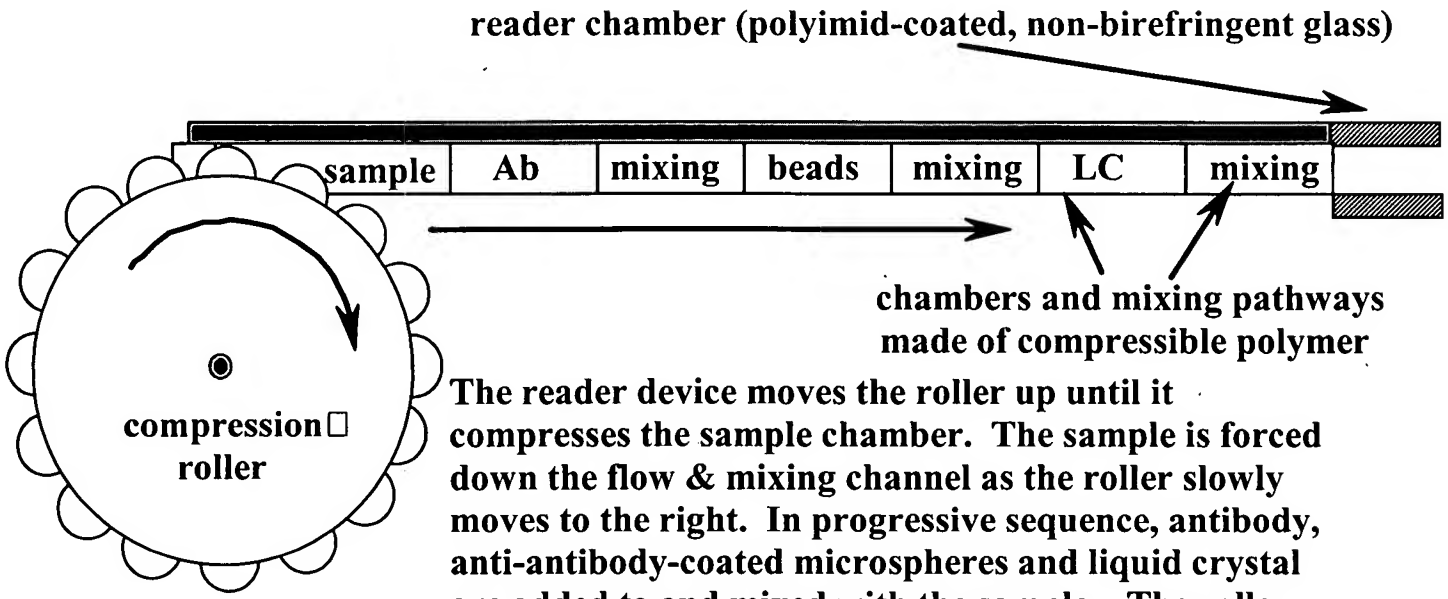


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Figure 11

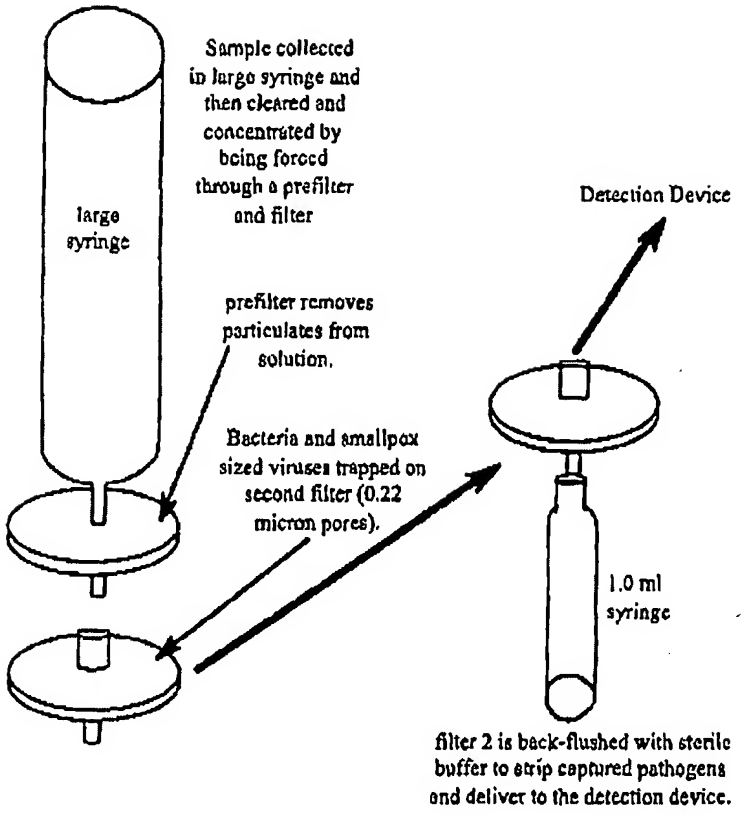
Sample collected in large syringe and then cleared and concentrated by being forced through a prefilter and filter
large syringe
Detection Device
prefilter removes particulates from solution.
Bacteria and smallpox sized viruses trapped on second filter (0.22 micron pores).
1.0 ml syringe
filter 2 is back-flushed with sterile buffer to strip captured pathogens and deliver to the detection device.

Figure 12

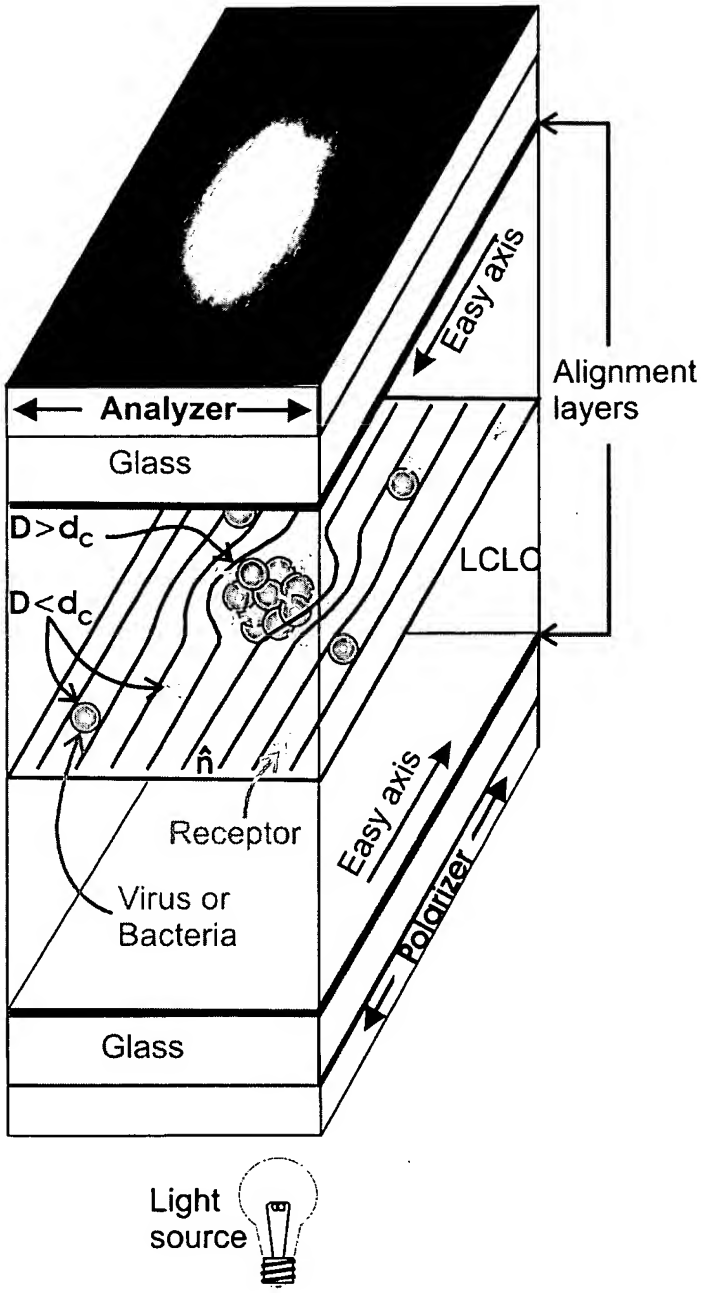
Analyzer
Glass
D>d_c
D<d_c
n̂
Receptor
Virus or
Bacteria
Glass
Light
source
Easy axis
Alignment
layers
LCLC
Easy axis
Polarizer

Figure 13

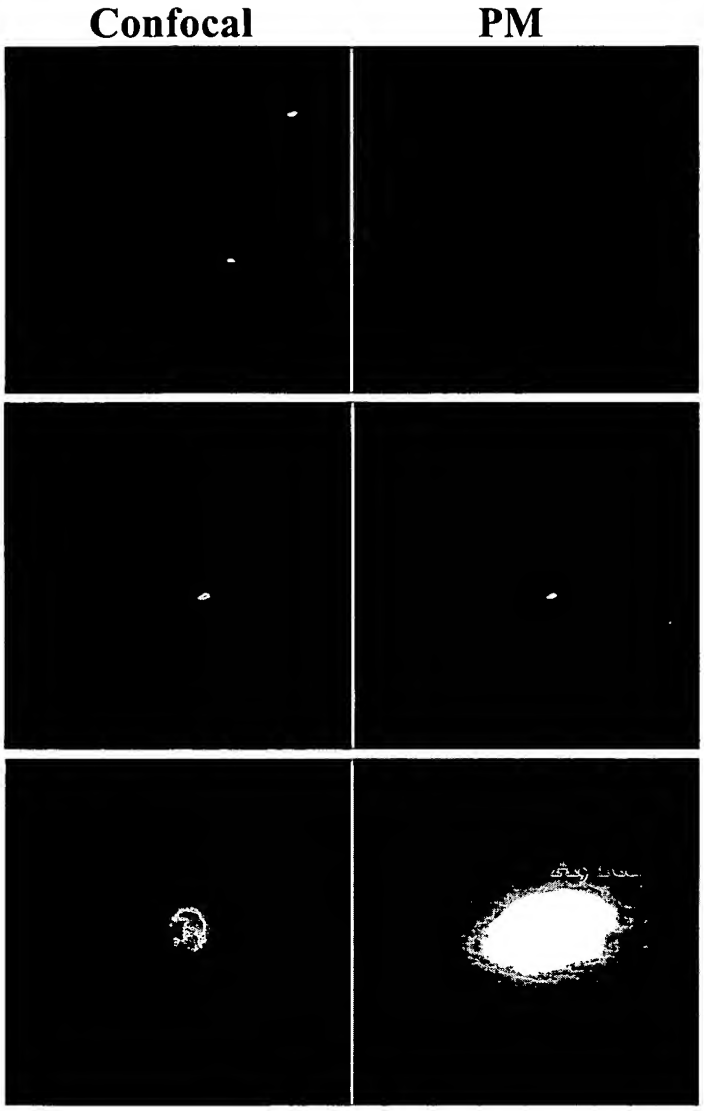

Figure 14

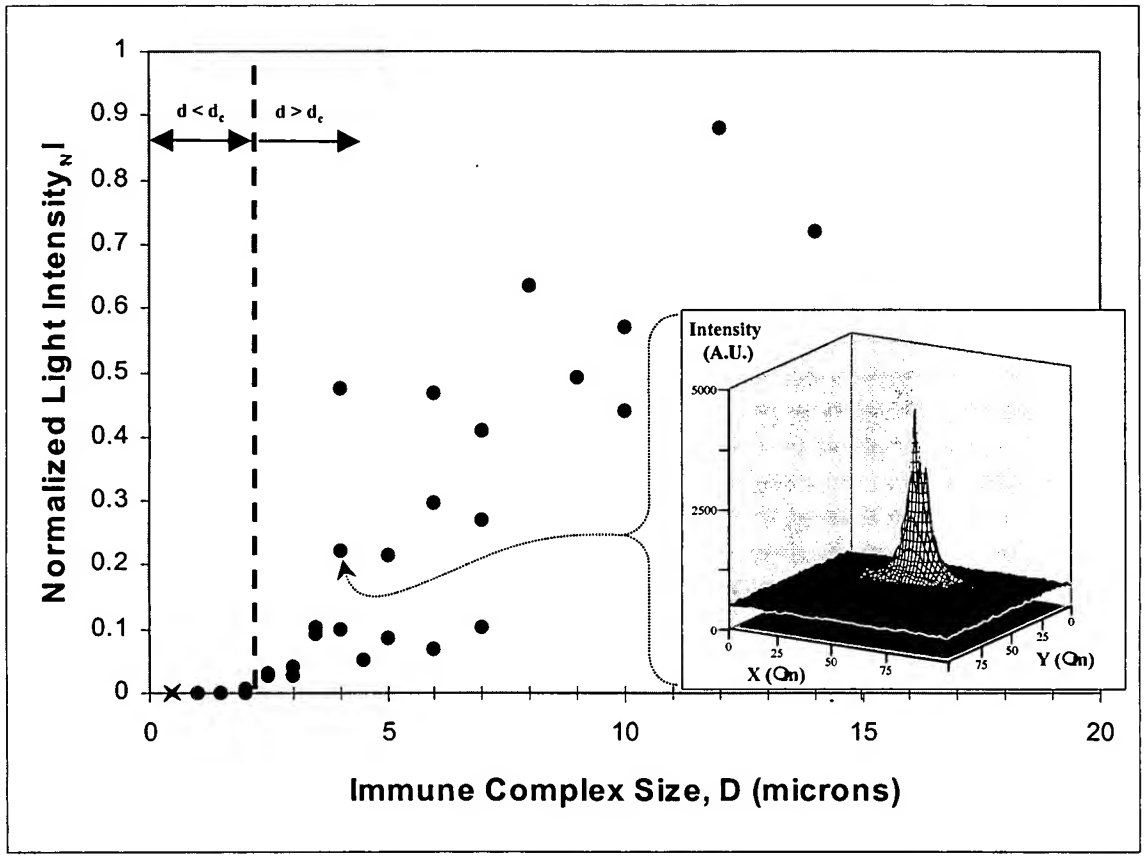
Normalized Light Intensity, I
Immune Complex Size, D (microns)
d < d_c
d > d_c
Intensity
(A.U.)
X (Qn)
Y (Qn)

Figure 15

Figure 16

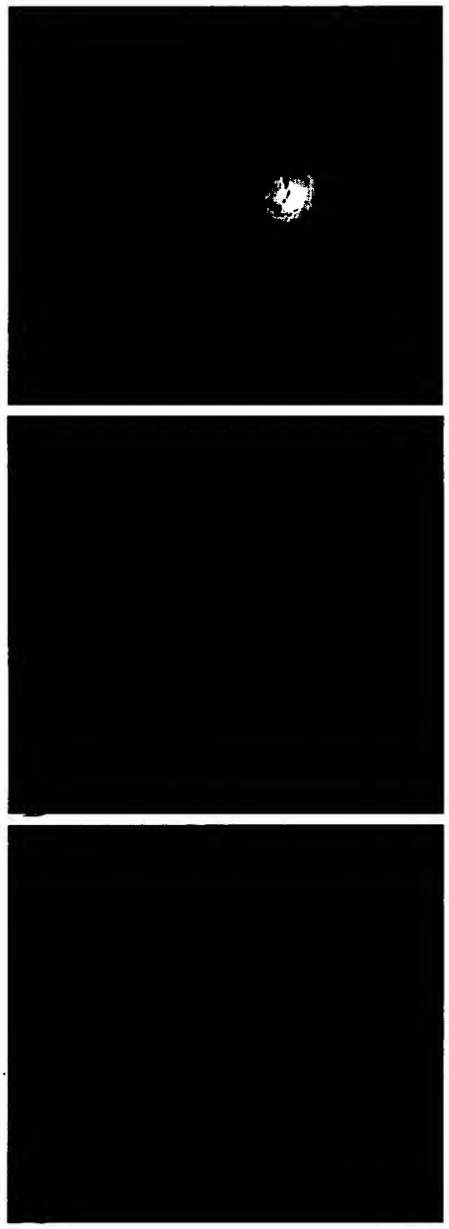

Figure 17